

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 992456/JS	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/ FI 00/ 00990	International filing date (day/month/year) 14/11/2000	(Earliest) Priority Date (day/month/year) 16/11/1999
Applicant MISCEL OY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

DRUM MOTOR

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/FI 00/00990

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H02K7/10 //B65G23/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H02K B65G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 771 197 A (IVANTO OSMO ET AL) 13 September 1988 (1988-09-13) column 1, line 54 -column 2, line 21; figure 1	1,2, 4-13,15, 16
A	---	3,14
A	US 5 918 728 A (SYVERSON CHARLES D) 6 July 1999 (1999-07-06) column 1, line 9 - line 61 column 3, line 43 - line 61 ---	1-16
A	DE 297 17 062 U (BDL MASCHINENBAUGESELLSCHAFT M) 18 December 1997 (1997-12-18) page 2, line 1 -page 3, line 13 page 4, line 25 - line 33 -----	1-16

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

12 April 2001

Date of mailing of the international search report

07.05.01

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

T. Erlandsson/MN

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/FI 00/00990

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4771197	A	13-09-1988	BR 8202615 A	19-04-1983
			DE 3216978 A	25-11-1982
			FR 2505574 A	12-11-1982
			GB 2101814 A	19-01-1983
			JP 57206255 A	17-12-1982
			SE 453785 B	29-02-1988
			SE 8202853 A	08-11-1982

US 5918728	A	06-07-1999	US 6206181 B	27-03-2001

DE 29717062	U	18-12-1997	NONE	

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
25 May 2001 (25.05.2001)

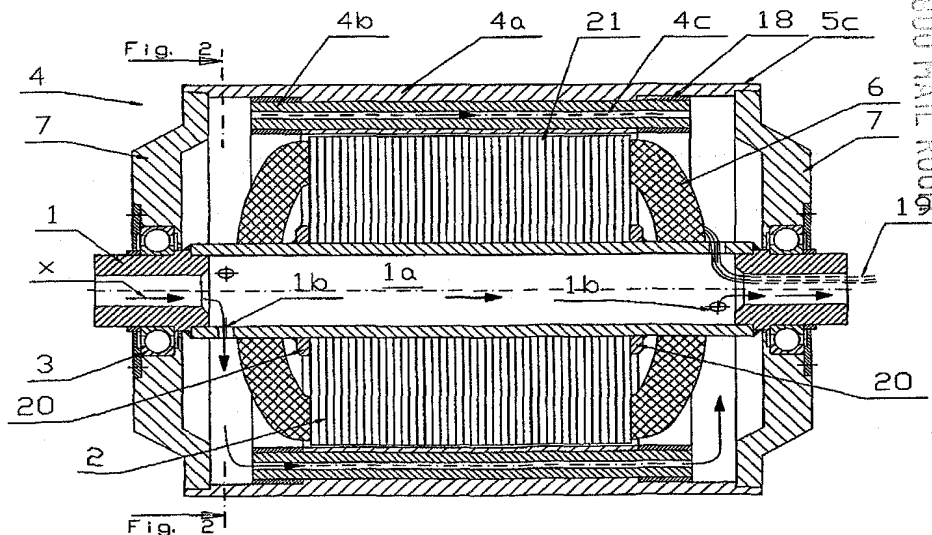
PCT

(10) International Publication Number
WO 01/37398 A3

- (51) International Patent Classification⁷: **H02K 7/10 // B65G 23/08**
- (21) International Application Number: **PCT/FI00/00990**
- (22) International Filing Date:
14 November 2000 (14.11.2000)
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
19992456 16 November 1999 (16.11.1999) **FI**
- (71) Applicant (for all designated States except US): **MISCEL OY [FI/FI];** Pyynikintori 8 A 16, FIN-33230 Tampere (FI).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **SOITU, Viktor [RU/FI];** Kourulanraitti 3 A 12, FIN-53810 Lappeenranta (FI).
- (74) Common Representative: **MISCEL OY; Pyynikintori 8 A 16, FIN-33230 Tampere (FI).**
- (81) Designated States (national): **AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.**
- (84) Designated States (regional): **ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).**
- Published:
— with international search report
- (88) Date of publication of the international search report:
1 November 2001

[Continued on next page]

(54) Title: **DRUM MOTOR**



(57) Abstract: The object of this invention is the construction in electric motor drive, where a asynchronous motor, such as drum motor, which has a stator (2) mounted on a non-rotatory shaft (1) and has rotatory, like by means of bearings (3), connected rotor (4), is arranged to drive the machine construction (actuator). The rotor (4) of the asynchronous motor conveyor's is arranged to be directly a functional part of the machine construction (actuator), like conveyor's (5) driving roll (5a). Also the rotor can be formed as a shell of pulley (4) which is part of a vacuum belt conveyor comprising a stationary vacuum box (11), the rotor drive further comprising: said non-rotatory shaft (1) being supported by at least one supporting bracket (8) which is connected to the vacuum box. The object of this invention is also the method for corresponding purpose.

WO 01/37398 A3

WO 01/37398 A3



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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PCT/FI 00/00990

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Name and mailing address of the ISA

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Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

T. Erlandsson/MN

INTERNATIONAL SEARCH REPORT

information on patent family members

Inter: nal Application No

PCT/FI 00/00990

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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			DE 3216978 A	25-11-1982
			FR 2505574 A	12-11-1982
			GB 2101814 A	19-01-1983
			JP 57206255 A	17-12-1982
			SE 453785 B	29-02-1988
			SE 8202853 A	08-11-1982

US 5918728	A	06-07-1999	US 6206181 B	27-03-2001

DE 29717062	U	18-12-1997	NONE	

09/889279

Copy for the designated Office (DO/US)

PCT/FI00/00990

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

LINDEN, Volker
Brahmsstrasse 30
73430 Aalen
ALLEMAGNE

Date of mailing (day/month/year)

10 December 2001 (10.12.01)

Applicant's or agent's file reference

PN11233

IMPORTANT NOTIFICATION

International application No.

PCT/FI00/00990

International filing date (day/month/year)

14 November 2000 (14.11.00)

1. The following indications appeared on record concerning:

☐

the applicant

☐

the inventor

☒

the agent

☐

the common representative

Name and Address

MISCEL OY
Pyyrikintori 8 A 16
FIN-33230 Tampere
Finland

State of Nationality

State of Residence

Telephone No.

+358-400-268 917

Facsimile No.

+358-3-3141 0041

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒

the person

☒

the name

☒

the address

☐

the nationality

☐

the residence

Name and Address

LINDEN, Volker
Brahmsstrasse 30
73430 Aalen
Germany

State of Nationality

State of Residence

Telephone No.

+49 6257-69 693

Facsimile No.

+49 6257-69 695

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒

the receiving Office

☐

the International Searching Authority

☐

the International Preliminary Examining Authority

☒

the designated Offices concerned

☐

the elected Offices concerned

☒

other: MISCEL OY

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

François BAECHLER

Facsimile No.: (41-22) 740.14.35

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

LINDEN, Volker
Brahmsstrasse 30
73430 Aalen
ALLEMAGNE

Date of mailing (day/month/year) 10 December 2001 (10.12.01)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference PN11233	
International application No. PCT/FI00/00990	International filing date (day/month/year) 14 November 2000 (14.11.00)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address MISCEL OY Pyyrikintori 8 A 16 FIN-33230 Tampere Finland	State of Nationality FI	State of Residence FI
	Telephone No. +358-400-628 917	
	Facsimile No. +358-3-3141 0041	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person ☒ the name ☒ the address ☒ the nationality ☒ the residence

Name and Address VOITH PAPER PATENT GMBH St. Pöltener Strasse 43 89522 Heidenheim Germany	State of Nationality DE	State of Residence DE
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

3. Further observations, if necessary:

Transfer of rights has been recorded.

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input checked="" type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input type="checkbox"/> the elected Offices concerned
<input type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer François BAECHLER
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

INTERNATIONAL APPLICATION

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
25 May 2001 (25.05.2001)

PCT

(10) International Publication Number
WO 01/37398 A2

- (51) International Patent Classification⁷: H02K
- (21) International Application Number: PCT/FI00/00990
- (22) International Filing Date:
14 November 2000 (14.11.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
19992456 16 November 1999 (16.11.1999) FI
- (71) Applicant (for all designated States except US): MISCEL OY [FI/FI]; Pyyrikintori 8 A 16, FIN-33230 Tampere (FI).

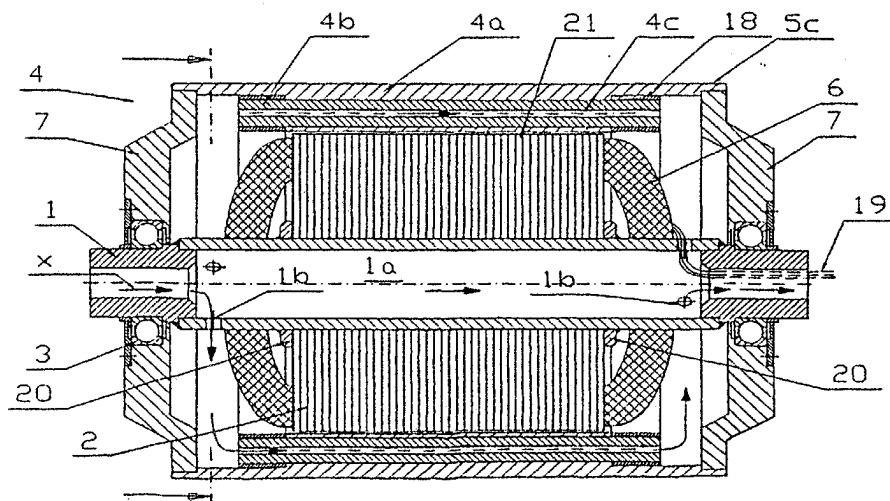
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

- (72) Inventor; and
- (75) Inventor/Applicant (for US only): SOITU, Viktor [RU/FI]; Kourulanraitti 3 A 12, FIN-53810 Lappeenranta (FI).
- (74) Common Representative: MISCEL OY; Pyyrikintori 8 A 16, FIN-33230 Tampere (FI).

Published:
— Without international search report and to be republished upon receipt of that report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CONSTRUCTION AND METHOD IN ELECTRIC MOTOR DRIVE



(57) Abstract: The object of this invention is the construction in electric motor drive, where a asynchronous motor, such as drum motor, which has a stator (2) mounted on a non-rotatory shaft (1) and has rotatory, like by means of bearings (3), connected rotor (4), is arranged to drive the machine construction (actuator). The rotor (4) of the asynchronous motor conveyor's is arranged to be directly a functional part of the machine construction (actuator), like conveyor's (5) driving roll (5a). Also the rotor can be formed as a shell of pulley (4) which is part of a vacuum belt conveyor comprising a stationary vacuum box (11), the rotor drive further comprising: said non-rotatory shaft (1) being supported by at least one supporting bracket (8) which is connected to the vacuum box. The object of this invention is also the method for corresponding purpose.

WO 01/37398 A2

PCT REQUEST

Original (for SUBMISSION) - printed on 13.11.2000 03:29:51 PM

992456/JS

0	For receiving Office use only	
0-1	International Application No.	
0-2	International Filing Date	
0-3	Name of receiving Office and "PCT International Application"	
0-4	Form - PCT/RO/101 PCT Request	
0-4-1	Prepared using	PCT-EASY Version 2.91 (updated 10.10.2000)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	National Board of Patents and Registration (Finland) (RO/FI)
0-7	Applicant's or agent's file reference	992456/JS
I	Title of invention	CONSTRUCTION AND METHOD IN ELECTRIC MOTOR DRIVE
II	Applicant	
II-1	This person is:	applicant only
II-2	Applicant for	all designated States except US
II-4	Name	MISCEL OY
II-5	Address:	Pyynikintori 8 A 16 FIN-33230 Tampere Finland
II-6	State of nationality	FI
II-7	State of residence	FI
II-8	Telephone No.	+358-400-268 917
II-9	Facsimile No.	+358-3-3141 0041
III-1	Applicant and/or inventor	
III-1-1	This person is:	applicant and inventor
III-1-2	Applicant for	US only
III-1-4	Name (LAST, First)	SOITU, Viktor
III-1-5	Address:	Kourulanraitti 3 A 12 FIN-53810 Lappeenranta Finland
III-1-6	State of nationality	FI RLL
III-1-7	State of residence	FI

PCT REQUEST

992456/JS

Original (for SUBMISSION) - printed on 13.11.2000 03:29:51 PM

IV-1	Agent or common representative; or address for correspondence The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	common representative
IV-1-1	Name	MISCEL OY
IV-1-2	Address:	Pyynikintori 8 A 16 FIN-33230 Tampere Finland
IV-1-3	Telephone No.	+358-400-268 917
IV-1-4	Facsimile No.	+358-3-3141 0041
V	Designation of States	
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AP: GH GM KE LS MW MZ SD SL SZ TZ UG ZW and any other State which is a Contracting State of the Harare Protocol and of the PCT EA: AM AZ BY KG KZ MD RU TJ TM and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR and any other State which is a Contracting State of the European Patent Convention and of the PCT OA: BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG and any other State which is a member State of OAPI and a Contracting State of the PCT
V-2	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AE AG AL AM AT (patent and utility model) AU AZ BA BB BG BR BY BZ CA CH&LI CN CR CU CZ (patent and utility model) DE (patent and utility model) DK (patent and utility model) DM DZ EE (patent and utility model) ES FI (patent and utility model) GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK (patent and utility model) SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW

PCT REQUEST

3/4

992456/JS

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V-5	Precautionary Designation Statement In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit.		
V-6	Exclusion(s) from precautionary designations	NONE	
VI-1	Priority claim of earlier national application		
VI-1-1	Filing date	16 November 1999 (16.11.1999)	
VI-1-2	Number	19992456	
VI-1-3	Country	FI	
VI-2	Priority document request The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	VI-1	
VII-1	International Searching Authority Chosen	European Patent Office (EPO) (ISA/EP)	
VIII	Check list	number of sheets	electronic file(s) attached
VIII-1	Request	4	-
VIII-2	Description	17	-
VIII-3	Claims	5	-
VIII-4	Abstract	1	992456.txt
VIII-5	Drawings	5	-
VIII-7	TOTAL	32	
VIII-8	Accompanying items	paper document(s) attached	electronic file(s) attached
VIII-8	Fee calculation sheet	✓	-
VIII-9	Separate signed power of attorney	✓	-
VIII-16	PCT-EASY diskette	-	diskette
VIII-17	Other (specified):	Copy of the first Official Action	-
VIII-18	Figure of the drawings which should accompany the abstract	Fig. 1	
VIII-19	Language of filing of the international application	English	

PCT REQUEST

992456/JS

Original (for SUBMISSION) - printed on 13.11.2000 03:29:51 PM

IX-1	Signature of applicant or agent	
IX-1-1	Name	MISCEL OY
IX-1-2	Name of signatory	Jaakko Säiläkivi
IX-1-3	Capacity	Managing Director

FOR RECEIVING OFFICE USE ONLY

10-1	Date of actual receipt of the purported international application	
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/EP
10-6	Transmittal of search copy delayed until search fee is paid	

FOR INTERNATIONAL BUREAU USE ONLY

11-1	Date of receipt of the record copy by the International Bureau	
------	--	--

358 3 31410041
INTERNATIONAL SEARCH REPORT

International Application No

PCT/FI 00/00990

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 771 197 A (IVANTO OSMO ET AL) 13 September 1988 (1988-09-13) column 1, line 54 - column 2, line 21; figure 1	1,2, 4-13,15, 16
A	---	3,14
A	US 5 918 728 A (SYVERSON CHARLES D) 6 July 1999 (1999-07-06) column 1, line 9 - line 61 column 3, line 43 - line 61	1-16
A	---	1-16
	DE 297 17 062 U (BDL MASCHINENBAUGESELLSCHAFT M) 18 December 1997 (1997-12-18) page 2, line 1 - page 3, line 13 page 4, line 25 - line 33 -----	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

12 April 2001

Date of mailing of the international search report

07.05.01

Name and mailing address of the ISA

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IN . . . 358 3 31410041
INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/FI 00/00990

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4771197	A	13-09-1988	BR 8202615 A	19-04-1983
			DE 3216978 A	25-11-1982
			FR 2505574 A	12-11-1982
			GB 2101814 A	19-01-1983
			JP 57206255 A	17-12-1982
			SE 453785 B	29-02-1988
			SE 8202853 A	08-11-1982
US 5918728	A	06-07-1999	US 6206181 B	27-03-2001
DE 29717062	U	18-12-1997	NONE	

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
25 May 2001 (25.05.2001)

PCT

(10) International Publication Number
WO 01/37398 A2

(51) International Patent Classification⁷: H02K

(21) International Application Number: PCT/FI00/00990

(22) International Filing Date:
14 November 2000 (14.11.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
19992456 16 November 1999 (16.11.1999) FI

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(81) Designated States (*national*): AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

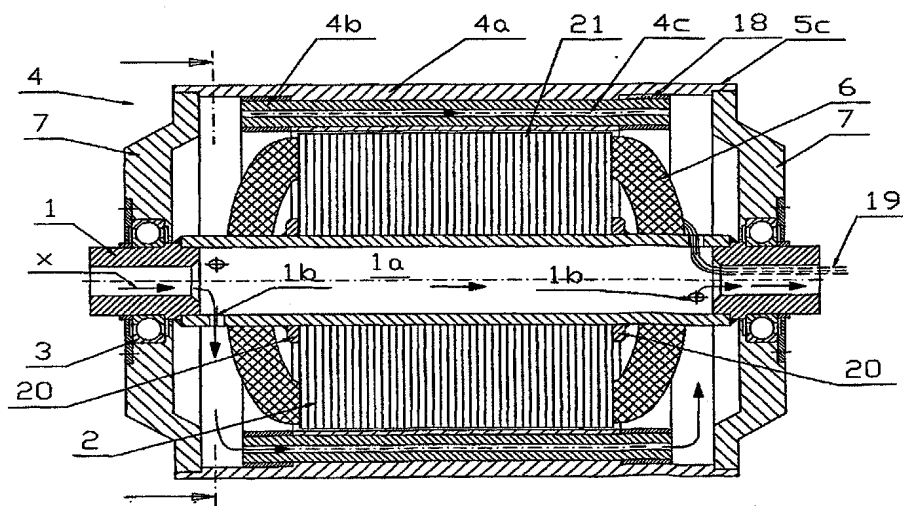
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— Without international search report and to be republished upon receipt of that report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CONSTRUCTION AND METHOD IN ELECTRIC MOTOR DRIVE



(57) Abstract: The object of this invention is the construction in electric motor drive, where a asynchronous motor, such as drum motor, which has a stator (2) mounted on a non-rotatory shaft (1) and has rotatory, like by means of bearings (3), connected rotor (4), is arranged to drive the machine construction (actuator). The rotor (4) of the asynchronous motor conveyor's is arranged to be directly a functional part of the machine construction (actuator), like conveyor's (5) driving roll (5a). Also the rotor can be formed as a shell of pulley (4) which is part of a vacuum belt conveyor comprising a stationary vacuum box (11), the rotor drive further comprising: said non-rotatory shaft (1) being supported by at least one supporting bracket (8) which is connected to the vacuum box. The object of this invention is also the method for corresponding purpose.

Construction and method in electric motor drive

The object of this invention is the construction in
5 electric motor drive, where an asynchronous motor, such
as drum motor or similar motor, which has a stator
mounted on a non-rotatory shaft and around the stator
is a rotor, which is rotatory, like by means of
bearings, connected on the same shaft and has a short-
10 circuit arrangement, is arranged to drive a machine
construction (actuator).

Above described types of asynchronous, compact drum
motors have been presented for example in publications
15 EP 0 582 563,
US 4,868,436 and FI 811414. Among these, the first-
mentioned solution is carried into effect by keeping
separate and individual copper short-circuit bars in
their position by pressing them in place with collars
20 mounted on the end flanges of the motor.

The disadvantage of this type of solution is the poor
heat transmission from the short-circuit bars to the
rotor shell. Further in the solution of US-patent
25 4,868,436 the rotor structure is built up of so called
active part i.e. electric plate package and at least
two separate rotor shell parts i.e. support flange and
onto it by means of screw coupling connected rotor
shell, which makes the solution in question
30 unnecessarily complicated. In application publication
EP 0 617 155 there is a much similar solution (of above
mentioned U.S.-patent), where motor's rotor package,
which is constructed/laminated of electric plates, is

connected together with it's short-circuiting
conductors to drum roller by means of screw/press
coupling, which operates as a roll surface. Also this
solution is disadvantageous especially in
5 manufacturing. Further in latter Finnish patent
application is presented a drum motor, which is
designed especially for

elevator purposes. In this solution a separate roller
10 with cable grooves and brake surface area for
elevator's lifting cables and brakes is mounted on the
upper shell of the rotor. E.g. in this solution is
additionally proposed that the motor cooling is taken
care of by machining radial ventilation holes in the
15 roller and stator and to blow the cooling air to the
holes with a separate blower.

To all of the above mentioned solutions it is common,
that first of all respectively used machine
20 construction (actuator)'s connection to the drum motor
requires special mounting arrangements and/or extra
parts for it i.e. a separate drive roll to be assembled
on to an electrical motor's rotor (EP 0 582 563), a
firmly assembled flange arrangement on the motor's
25 frame (US 4,868,436) or a shell to be assembled outside
the drum motor (FI 811414 and
EP 0 617 155 A1). On the other hand in the motor
constructions in the above mentioned innovations the
cooling circulation is carried out by traditional
30 means, thus it is not possible to reach higher outputs
than with standard drum motor solutions.

The purpose of the construction of this invention is to overcome the above-described disadvantages and thereby essentially improve the level of the technique in this area. It is principally distinctive to the construction according to this invention, to carry out this purpose, that the functional part of the machine construction (actuator), like conveyor's driving roll or similar, is arranged to operate by having short-circuit arrangement as the rotor of the asynchronous motor. In other words: the "actuator" (e.g. driving roll) is formed to constitute itself the rotor of the asynchronous motor, with the actuator comprising the short-circuit arrangement.

15

The construction according to the invention is characterized by that the functional part of the machine construction (actuator), like conveyor's driving roll, is arranged to operate by having short-circuit arrangement as the rotor of the asynchronous motor.

It should be noted that the term "actuator comprising the short-circuit arrangement" is referring to many various (or different) embodiments. In the most simple embodiment, the actuator is formed as a one-piece solid roll shell being free from short-circuit bars and rings (also being free from laminated elements).

In another embodiment (also being free from laminated elements) short-circuit bars and rings are provided. Each of the bars and the rings will be located within the roll shell, preferably with a tight or positive fit

(or locking) being provided between each bar and the roll shell, whereby additional mounting elements (e.g. collars and/or screws) are no more needed.

5 The most important advantages of the construction of this invention is the simplicity of its construction, manufacturing and usage, efficiency and reliability of working, which attain the most possible integrated and compact machine configuration, which allow to get
10 higher output and higher torque from the used asynchronous massive rotor and significantly to improve its performance in other ways too. The simplicity of the construction of this invention as advantageous solution is based e.g. on fact there is no need to use
15 traditional short-circuiting conductors, as the short-circuit arrangement is established directly into the functional part of the machine construction (actuator), like conveyor's driving roll. On the other hand the structure of
20 this invention makes it possible to use the traditional short-circuiting connectors in a new way, so that they are located essentially internally on a functional part of the machine construction (actuator) as the rotor shell, like conveyor's driving roll. When applying
25 advantageously the structure of this invention, the asynchronous motor is equipped with primary and secondary cooling circulation to cool both the stator and the rotor for example so that the cooling fluid is firstly essentially carried through the stator shaft
30 and with the help of the holes in the shaft elsewhere as parallel flow through the flow system in the rotor shell. As a further improvement the rotor is manufactured of electric conductive compound metal

structure, where copper short-circuit bars or pipes and rings are for example explosion welded into pre-drilled/machined holes/slots. On the other hand during manufacturing of the asynchronous motor it is possible
5 to utilize also a casting technique.

Further advantageous solution is to assemble the stator on the hollow shaft/pipe also working as stator shaft, which is used for example to feed over-pressure cooling
10 air. Herewith it is effectuated a hermetic primary cooling, which is known from EP 0 617 155 and which prevents dirt to penetrate into the drum motor, which is not possible to prevent with the conventional effectuated freely (open) breathing air-cooled
15 solutions. Further advantageous feature is that the short-circuit hollow bars or pipes are positioned within the rotor shell, functioning as secondary cooling channels. Thereby it is possible to carry the cooling air to the hottest spots of the rotor, which
20 helps in its way significantly both to obtain the maximum output and to increase the amount of starts/stops of the machine construction (actuator) equipped with the motor in question.

25

The advantageous solutions of the structure of the invention have been presented in separate independent patent claims.

30

Object of this invention is also a method for equivalent purpose, which is more specifically described in independent patent claim's introduction

section and whose characteristic features in corresponding patent claim's characteristic section.

5 The method according to the invention is characterized by that the functional part of the machine construction (actuator), like conveyor's driving roll, is arranged to operate by having short-circuit arrangement as the rotor of the asynchronous motor.

10

One of the most important advantages the method of this invention has, is the simplicity of the operating principle and the simple constructions which makes it possible and the reliability of working and which
15 allows to gain the utmost compact machine construction (actuator) unit with integrally united asynchronous motor to achieve high mechanical load capacity, vibration strength and high starting and operation torque features. The simplicity of the method of this
20 invention as a advantageous solution is based for example on the fact that there is no need to use a separate laminated rotor component with traditional short-circuiting conductors inside a functional part of the machine construction, by establishing a short-
25 circuit arrangement directly into the functional part of the machine construction (actuator), like conveyor's driving roll. On the other hand the method of this invention makes it possible to use the traditional short-circuiting connectors in a new way, so that they
30 are located essentially internally on a functional part of the machine construction (actuator) as the rotor shell, like conveyor's driving roll.

Furthermore as an advantageous development of this innovation, it is possible to increase an air gap diameter between stator and rotor once a maximum outer diameter and total length of a drum motor is limited. Thus by this innovative design it is possible to get higher output power and higher torque compared to an asynchronous drum motor having same main dimensions as this new innovative drum motor construction and having a standard laminated rotor component inside a rotor shell.

Furthermore as an advantageous development of this method is to minimize the manufacturing costs of the here mentioned massive motor for example by manufacturing the rotor and the associated slots by casting them of steel.

Applying the method advantageously the asynchronous motor is being cooled effectively to get higher output than with conventional ones can be reached, because correctly carried out i.e. according to this invention realized for example hermetic and essentially in axial direction through the asynchronous motor carried cooling fluid flow makes it possible for example to direct the over-pressure cooling air to the hottest spots of the rotor, which is an essential condition both to increase the maximum output and to increase the amount of starts/stops. On the other hand compared to the freely breathing air-cooled solutions this solution prevents especially in hard conditions filth to penetrate into the drum motor structure.

Cooling of asynchronous motor with a solid rotor can be realised either with or without a secondary cooling arrangement via hollow bars or tubes inside a functional part of the machine construction (actuator) as the rotor shell. In such constructions the cooling is taken care of only with a primary cooling arrangement (e.g. air flow arrangement though an air gap between an inner surface of rotor shell and an outer surface of stator component.

Furthermore it is important that the short-circuit bars and rings belonging advantageously to the short-circuiting adjustment are arranged essentially integral with rotor shell i.e. at least partly or then totally with internal arrangements, and thus also a much more efficient heat conduction than present, between the steel shell and the copper short-circuit bars and rings can accomplished than with the traditional solutions. This also gives better possibilities for higher output and to increase the starts and stops of the asynchronous motor within a certain time interval.

Advantageous solutions of the method of the invention have been presented in separate independent patent claims.

The invention is in more detail presented in the description and the attached drawings.

Figure 1 presents

a longitudinal cross section of a typical machine construction (actuator) unit, which is accomplished with the method in this invention and

5

Figure 2 presents

a cross-profile of spots Fig 2 - Fig. 2. in Figure 1.

10

Figures 3a - 3C present

some alternative massive motor constructions of a drum motor.

Figures 4 and 5 present

15

a drum motor designed according to the invention and integrated to one end of a vacuum belt conveyor construction, with Fig. 5 being a section along line V - V of Fig. 4.

20 Referring to Figures 1 to 3, the object of this invention is a construction in electric motor drive, where a so called solid asynchronous motor, which has a stator 2 mounted on a non-rotatory shaft 1 and around the stator is a rotor 4, which is, like by means of

25 bearings 3, rotary connected on the same shaft 1 and has a short-circuit arrangement, is designed to drive a machine construction (actuator). The functional part of the machine construction (actuator), like conveyor's 5 driving roll 5a or 5b or 5c is designed to operate by

30 integrally connected short-circuit arrangement as the rotor 4 of the asynchronous motor. Especially in Figure 3c is shown the most simple structure of the invention, in which conveyor's driving roll 5a is realized with a

solid shell, which operates directly as the short-circuit arrangement of the rotor 4 without any traditional laminated rotor component with short-circuit conductors (e.g. short-circuit bars and rings).

- 5 The solution according to this principle is also shown in Figure 3b, where driving roll 5b is designed to operate as the rotor of the asynchronous motor with the solid shell having on its inner surface drilled or machined holes or grooves.

10

Different from Figures 3b and 3c, the invention may be advantageously used in connection with the structure, where the short-circuit arrangement can be realized in the rotor's shell 4a with short-circuiting conductor
15 bars 4b and rings 8. In this connection short-circuiting connector bars 4b and rings 18 are arranged to operate at least partly internally of

- the rotor's shell 4a operating as functional part of
20 the machine construction (actuator), such as conveyor's driving roll 5c. This type of solutions are presented especially in Figure 2, where round short-circuit bars 4b are being used and in Figure 3a where quadrangular short-circuit bars 4b' are being used in rotor shell
25 4a'. The bars 4b shown in Figure 2 may be hollow, so that each bar comprises a channel 4c for piping cooling fluid. At each end of shell 4a, a flange 7 is provided which connects the shell to one of the bearings 3.

- 30 In Figure 3a is shown a design, where conveyor's driving roll 5a is realised by a solid shell having quadrangular short-circuit bars on its inner surface. This type of electrical motor design should be used

when a compact drum motor constructions (e.g. maximum outer diameter and total length of the drum motor are limited) with high output power and torque are desired. Such a compact drum motor is needed in vacuum belt
5 conveyors used for "tail threading" in paper machines.

A typical design of drum motor's stator component 2 consists typically a pile of 0,3 - 1,0 mm thick electrical sheets 21 which are mounted on a stationary
10 hollow shaft 1 and fixed at their position by spot welding stator end plates 20 to the stationary shaft. Stator windings 6 are connected via electrical connection cable 19 to an external electric grid.

15 Figures 4 and 5 show one end of a vacuum belt conveyor comprising an endless air pervious belt 10 which - in operation - travels across two rotary pulleys, only one pulley 4 being shown. The pulleys are supported by a vacuum box 11. Therein a negative pressure will be
20 created by any vacuum source (not shown). The negative pressure will propagate through openings 12 of a cover plate 13 and through belt 10 in

order to convey a web of paper or similar material, in particular a lead strip or "tail" which has been
25 separated from threading purposes (see e.g. US patent 3,355,349).

In order to drive the belt 10, a pulley 4 is designed
30 as the rotor of an electric motor drive according to the present invention. Similar to Figure 1, a stationary hollow shaft 1 supports a stator 2 and (by means of bearings 3) the rotor 4, - which is the pulley

of the vacuum belt conveyor - and which again comprises a rotor shell 4a and two end-flanges 7.

Preferably, the following measures may be provided in
5 order to adapt the electric motor drive to the demands of a vacuum belt conveyor:

The width W of conveyor 5 (and also the length L of the pulley's shell 4a should be relatively small; about
10 0,25 m. The pulley's diameter should preferably be less than 0,15 m. On the other hand, the speed of the belt should be about the same as the operating speed of modern paper machines which may exceed 2000 m/min. Therefore, there is a need for very high motor output
15 while the dimensions of the motor drive should be relatively small.

To fulfil these demands, the distance D between the bearings 3 is larger than the length L of the pulley's
20 shell 4a, in order to increase the internal space being available for stator 2 and for the short-circuit arrangement of the rotor 4. As a consequence, each flange 7 is formed as a bushing which bridges the difference between length L and distance D.
25 Furthermore, each of the supporting brackets 8 which connect the stationary shaft 1 to the side walls of the vacuum box 11 is formed similar to a Z (in other words: it is "double
30 folded"). In addition, each support bracket 8 may be wrapped around the periphery of one of the flanges 7.

In order to improve the cooling effect, the hollow shaft 1 comprises at one of its ends an internal (e.g. coaxial) supply channel (15) as well as a discharge channel 16, as a result, all the cooling fluid X must
5 pass the inner side of stator 2 as well as its outer side and the inner side of the rotor (plus the channels 4c, if existing, in the bars 4b in Figure 1).

Also, the following is advantageous: The above
10 mentioned supporting brackets 8 can be used also as a connection surface for vacuum belt conveyor's accessories (e.g. knife plates, rotary rippers and choppers) (which is not shown as practical solution in enclosed drawings).

15 In addition to the things mentioned above, the cooling of the machine construction (actuator) operating as a rotor of a asynchronous motor is realized advantageously mainly with primary cooling by carrying
20 over-press cooling air X in axial direction through the stator shaft 1, which can be for example a hollow shaft, pipe or similar and it is equipped with it's first flow arrangement 1a. On the other hand when using advantageously the structure of this invention it is
25 possible to boost the cooling of the asynchronous motor besides what was described earlier or instead of it also with secondary cooling by equipping the short-circuiting bars 4b' with another flow arrangement 4c. Then, for example, it is possible to carry cooling air
30 X in axial direction through the hollow copper short-circuit bars 4b, for example, according to the principle in Figure 1 with the help of the holes 1b in the stator shaft 1 together with the primary air flow

1a which take place together with the parallel flow to the hottest sports of the rotor, which helps to get higher output from the machine construction (actuator) and especially to improve to carry the short run starts/stops.

Once an asynchronous motor has a solid rotor's cross section as shown in Figures 3a, 3b and 3c, cooling is taken care of an air flow arrangement through an air gap which locates between an inner surface of a rotor shell 5a, 5b, 5c and an outer surface of stator component 2.

Further advantageous solution of the structure of the invention is to manufacture the rotor of electric conductive compound metal structure, where copper short-circuit bars 4b; 4b' are integrally connected to the steel rotor shell 4a; 4a' for example by explosion welding or by centrifugal casting.

It is possible with the asynchronous motor realized according to the invention when using especially star type coupling for windings, to get the output of the drum motor equipped with three, four, or six pole stator windings always reach the level 0,5 - 500 kW and to have the speed of rotation typically in the area of 0 - 20000 rpm.

As a further advantageous development (which is not shown in enclosed drawings) it is advantageous to benefit the frequency transformer used by the asynchronous motor, which is equipped with active rotation speed control. In this connection rather

traditional solutions can be used to achieve the wanted effect.

The object of this invention is also a method with an
5 electric motor drive, where the machine construction
(actuator) is used by a asynchronous motor, such as
drum motor, which has a stator 2 mounted on a non-
rotatory shaft 1 and around the stator is a rotor 4,
which is rotatory, like by means of bearings 3,
10 connected on the same shaft 1 and has a short-circuit
arrangement. The functional part of the machine
construction (actuator), like conveyor's 5 driving roll
5a, is arranged to operate by having short-circuit
arrangement as the rotor 4 of the asynchronous motor
15 (typical constructions shown in Figures 2 and 3a). The
method according to this principle is applied in
simplest way for example in constructions in Figure 3b,
wherein driving roll's 5b machined grooves/slots 5d are
arranged as the short-circuit arrangement. On the other
20 hand in Figure 3c is a similar type of solution without
traditional short-circuit bars, wherein the driving
roll 5a is realized a solid shell, which operates
directly as the short-circuiting arrangement.

25 Furthermore as an advantageous application of this
method it is advantageous to benefit it with
asynchronous motor, whose short-circuit arrangement is
connected to the rotor 4, like short circuiting bars 4b
and rings 8 are supported on rotor's shell 4a. In this
30 connection short-circuit bars and rings belonging to
the short-circuit arrangement are arranged to operate
at least partly internally as the rotor's 4 shell 4a of
the operating functional part of the machine

construction (actuator), such as conveyor's driving roll 5a. In this connection this type of solution is presented, especially in Figure 2, showing round short-circuit conductors 4b and further in Figure 3a showing quadrangular short-circuit bars 4b'.

Furthermore referring to Figure 1 this method can be used with an asynchronous motor which is arranged to be cooled by having a fluid flow. The cooling of the asynchronous motor is realized as a closed system by carrying cooling fluid, such as over-pressure cooling air X, hermetically essentially in axial direction in a primary flow arrangement 1a through the stator shaft 1 like hollow shaft, pipe or similar. On the other hand the cooling of the asynchronous motor can be arranged instead of as described above by carrying cooling fluid, such as over-pressure cooling air X hermetically essentially in axial direction in a secondary flow arrangement 4c provided in short-circuit conductors 4b like hollow bars or pipes.

Especially referring to Figure 1, as an example: Rotor 4 of the solid asynchronous motor is manufactured of electric conductive compound metal structure, when advantageously, for example, copper short circuit bars 4b which are welded, like explosive welded or butt welded into the holes in the steel rotor shell 4a or that they are cast integral with a most suitable casting method, like press casting method (solution is not presented in Figure 1). With above mentioned methods every short-circuit bar 4b and ring 18 is integrated as an integral part of rotor shell 4a, which allows to achieve better heat transmission between the

steel shell and copper short-circuit conductors. This fact has a great importance when trying to get higher maximum power from the machine constructions (actuators) than with traditional solutions and especially when short run starts/stops are in question. The same is true with the embodiment shown in Figure 3a comprising rotor shell 4a' and bar 4b'.

It is obvious that this invention is not limited to the above mentioned or explained solutions, it can be considerably modified within it's basic idea. Thereby it is possible firstly to utilize the construction or arrangement of this invention in most different connections, whereupon the dimensions and constructions can considerably differ from the hereby presented example drawings. On the other hand other type of fluids can be used in the cooling of the asynchronous motor realized according to the invention or the cooling can be done differently from what presented above.

Claims

1. A construction in electric motor drive,
5 where an asynchronous motor, such as drum motor,
which has a stator (2) mounted on a non-rotatory
shaft (1), and around the stator is a rotor (4),
which is rotatory, like by means of bearings (3),
connected on the same shaft (1) and has a short-
10 circuit arrangement, is designed to drive a machine
construction (actuator), **characterized in** that the
functional part of the machine construction
(actuator), like conveyor's (5) driving roll (5a,
5b, 5c), is arranged to operate by having short-
15 circuit arrangement as the rotor (4) of the
asynchronous motor.

2. The structure as claimed in claim 1,
wherein the short-circuit arrangement is established
20 by the short circuiting bars (4b, 4b') and rings
(18) supported on the rotor's shell (4a, 4a'),
characterized in that the short-circuiting bars (4b,
4b') and rings (18) belonging to the short-circuit
arrangement are arranged integral with the rotor's
25 (4) shell (4a, 4a'), which is a functional part of
the machine construction (actuator), like conveyor's
driving roll (5).

3. The structure as claimed in claim 1 or
30 claim 2, wherein an asynchronous motor is arranged
to be cooled by having a fluid flow, **characterized**
in that the cooling of the asynchronous motor is
realized in a closed system, by carrying cooling

fluid, such as over-pressure cooling air (x)
hermetically essentially in axial direction with
it's primary flow arrangement (1a) through the
stator shaft (1) like hollow shaft or pipe and/or
5 with secondary flow arrangement (4c) through short-
circuit conductors (4b) like hollow bars or pipes.

4. The structure as claimed in any of the
claims 1-3, **characterized in** that the rotor (4) of
10 the solid asynchronous motor comprises an of
electric conductive compound metal manufactured
structure, preferably comprising copper short
circuit conductors (4b, 4b'), which are welded by
explosive welding, butt welding into the holes in
15 the steel rotor shell (4a, 4a') or that they are
cast integral with the rotor shell in their places
by a suitable casting method (e.g. centrifugal
casting method).

20 5. The structure as claimed in any of the
claims 1-4, **characterized in** that that when using
especially star type coupling for windings, the
output of the asynchronous motor equipped with
three, four, or six pole stator windings is 0,5 -
25 500 kW having speed of rotation 0-20 000 rpm.

6. The structure as claimed in some of the
claims 1-5, **characterized in** that the asynchronous
motor is having a frequency transformer drive, which
30 is equipped with an active rotation speed control.

7. The structure as claimed in some of the
claims 1-6, **characterized in** that the rotor is

formed as a shell of a pulley (4) which is part of a vacuum belt conveyor (5) comprising a stationary vacuum box (11), the rotor drive further comprising: said central shaft (1) being supported by at least
5 one supporting bracket (8) which is connected to the vacuum box (11).

8. The structure as claimed in some of the claims 1-7, **characterized in** that the drum motor's
10 supporting brackets (8) can be used also as a connection surface(s) of the vacuum belt conveyor's accessories (e.g. knife plates, rotary rippers and choppers).

15 9. The structure as claimed in claim 7, **characterized in** that the distance D between the bearings (3) supporting the pulley (4) is larger than the length L of the pulley's shell (4a).

20 10. The structure as claimed in claim 9, wherein each flange (7) which connects an end of shell (4a, 4a') to one of the bearings (3) is formed as a bushing which bridges the distance between length L and D.

25 11. The structure as claimed in claim 9, wherein each supporting bracket (8) - seen in a longitudinal section of the conveyor (5), in Figure 5 - is formed double-folded similar to a Z.

30 12. Method for electric motor drive, where a machine construction (actuator) used by an asynchronous motor, such as drum motor, which has a

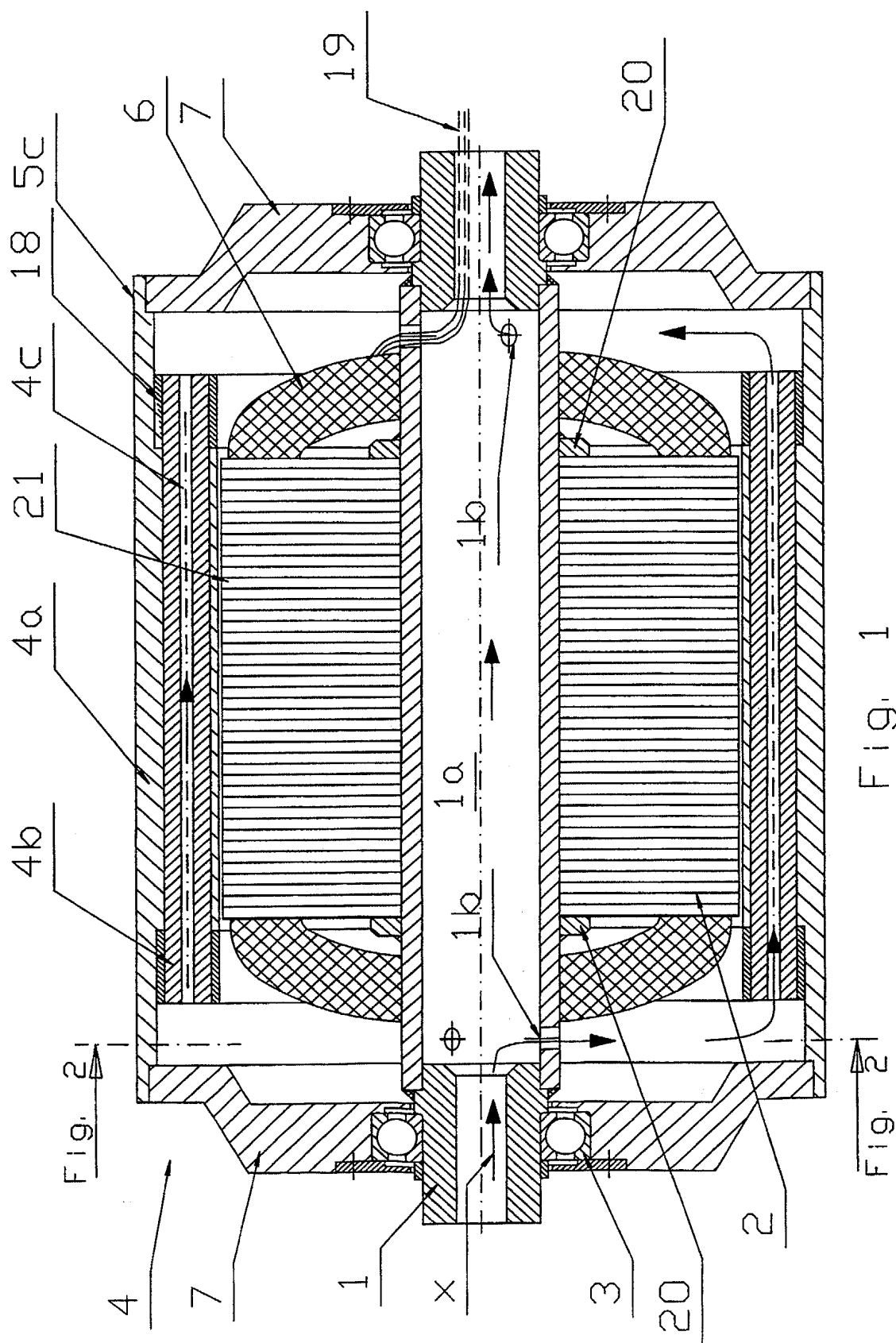
stator (2) mounted on a non-rotatory shaft (1) and around the stator is a rotor (4), which is rotatory, like by means of bearings (3), connected on the same shaft (1) and has a short-circuit arrangement, characterized in that the functional part of the machine construction (actuator), like conveyor's (5) driving roll (5a), operates by having short-circuit arrangement as the rotor (4) of the asynchronous motor.

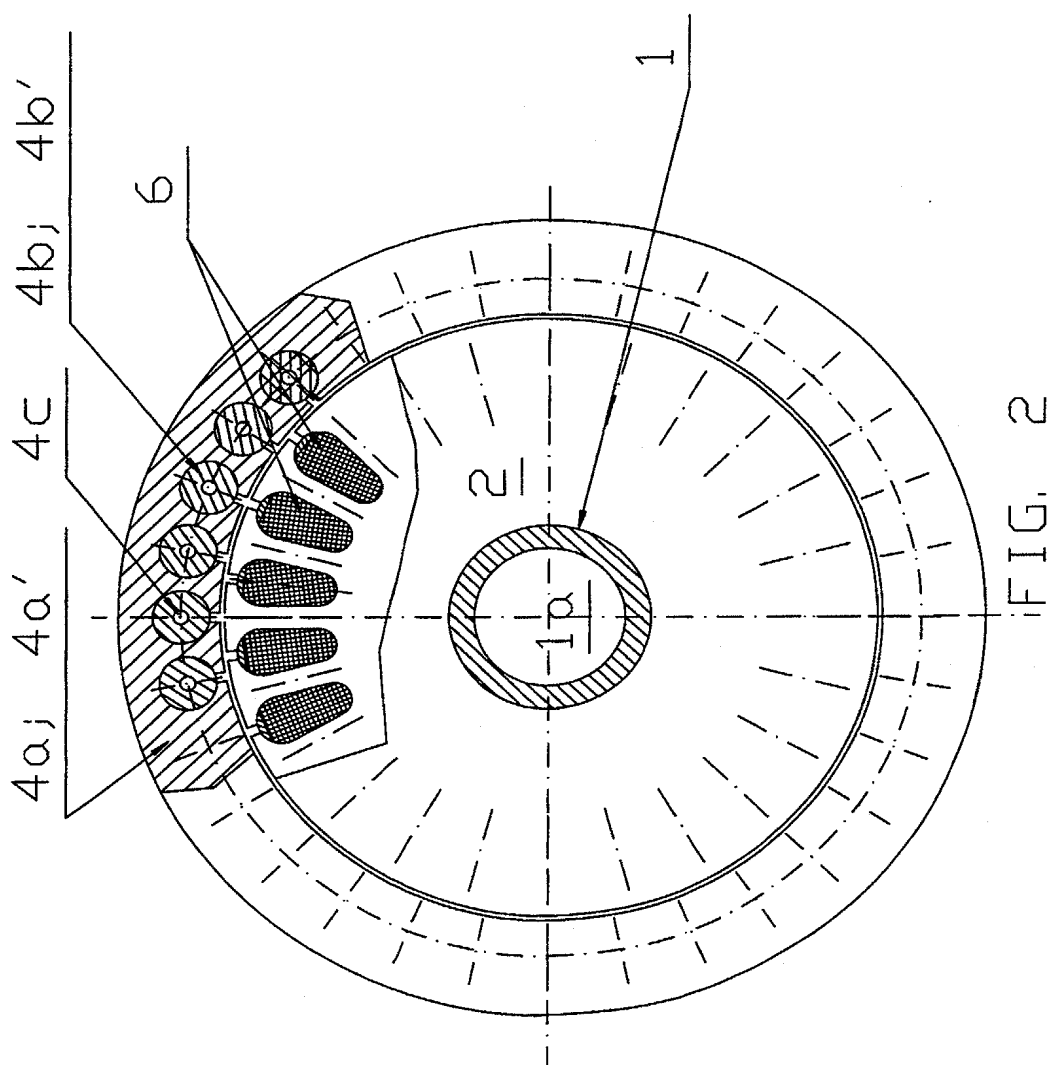
13. Method as claimed in claim 12 with asynchronous motor, where the short-circuit arrangement is realized in connection with the rotor (4) like having short-circuit conductor bars (4b, 4b') and rings (18) supported on the rotor's shell (4a), characterized in that to the short-circuit arrangement operate at least partly internally as the rotor's (4) shell (4a, 4a') of the operating functional part of the machine construction (actuator), such as conveyor's driving roll (5a, 5b, 5c).

14. Method as claimed in claim 12 or 13 wherein a asynchronous motor is cooled by having a fluid flow, characterized in that the cooling of the asynchronous motor is realized as closed by carrying cooling fluid, such as over-pressure cooling air (x) hermetically essentially in axial direction with it's primary flow arrangement (1a) through the stator shaft (1) like hollow shaft or pipe and/or through with secondary flow arrangement (4c) equipped short-circuit conductors (4b') like hollow bars or pipes.

15. Method as claimed in some of the claims
12-14, **characterized in** that the rotor (4) of the
solid asynchronous motor is manufacture of electric
5 conductive compound metal structure, whenupon most
suitable are copper short circuit conductors (4b,
4b'), which are connected into the holes and/or
grooves by welding, like explosive welding or butt
welding in the steel rotor shell (4a, 4a') or that
10 they are cast integral within the rotor by a
suitable casting method, like centrifugal casting
method.

16. Method as claimed in some of the claims
15 12-15, **characterized in** that the rotor is formed as
a shell of a pulley (4) which is part of a vacuum
belt conveyor (5) comprising a stationary vacuum box
(11), the rotor drive further comprising: said
central shaft (1) being supported by at least one
20 supporting bracket (8) which is connected to the
vacuum box (11).





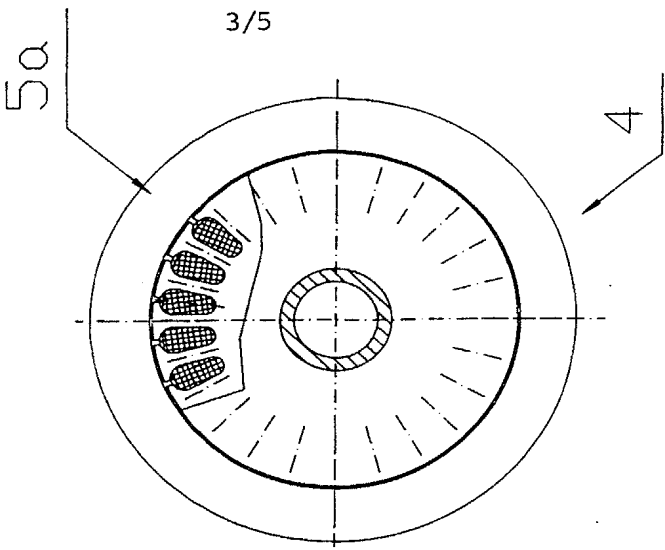


Fig. 3c

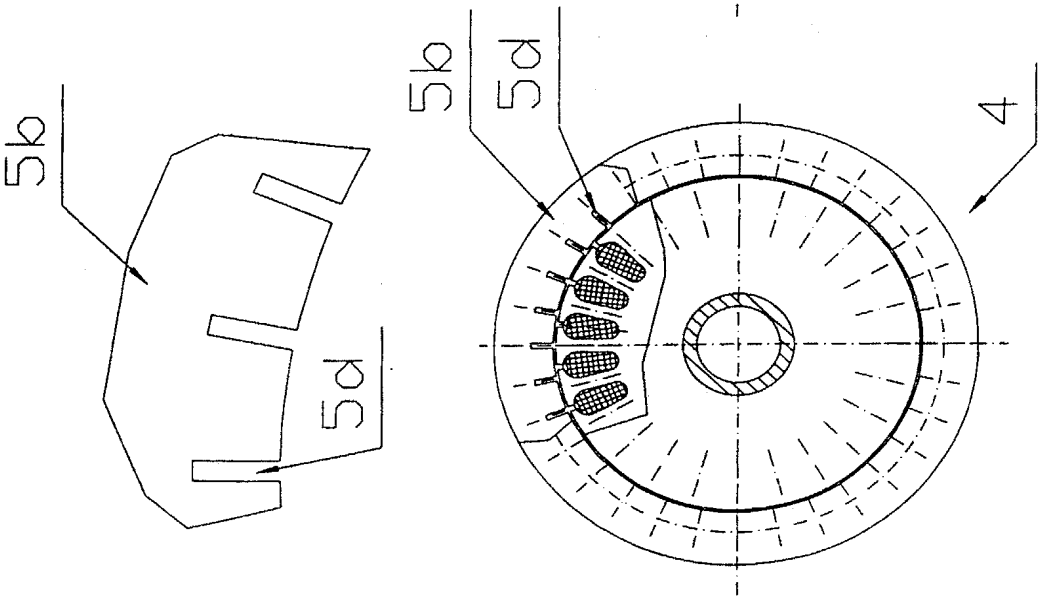


Fig. 3b

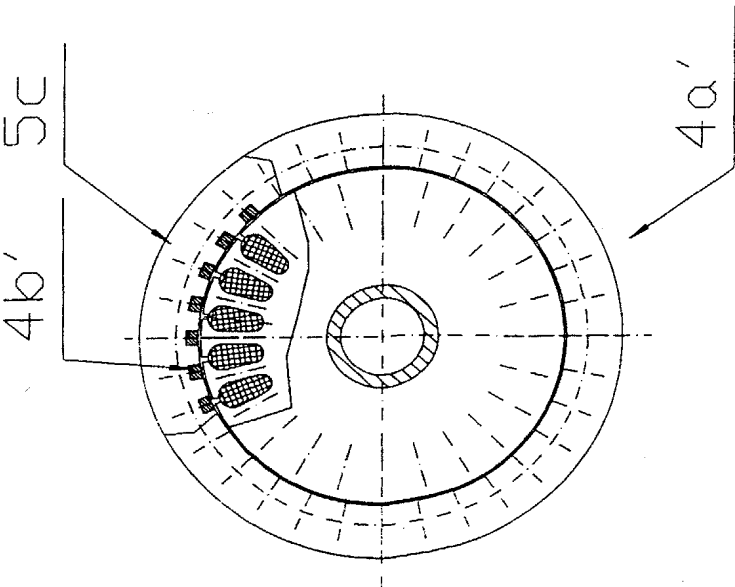


Fig. 3a

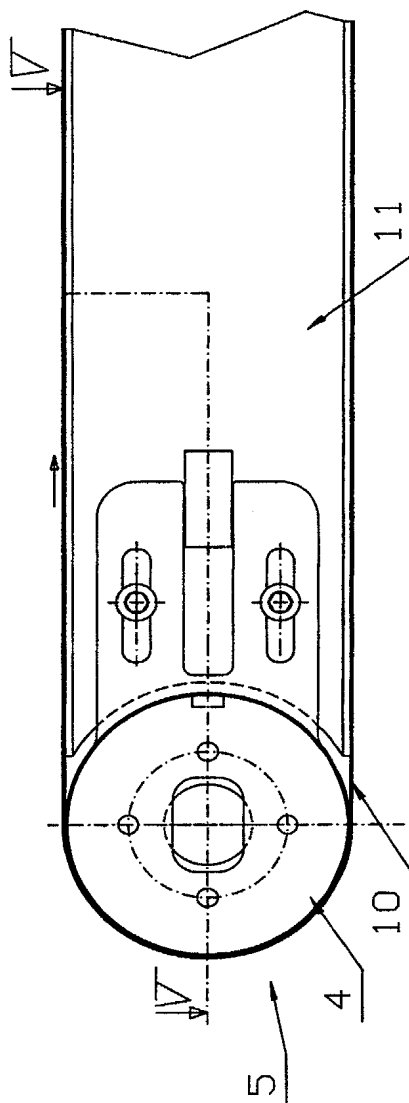


FIG. 4

